

CLAIMS

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1. A process for preparing a nanocomposite based on magnesium and at least one or several other elements or compounds known to absorb hydrogen and to be very few miscible with magnesium or its hydride during grinding, characterized in that it comprises:

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a) subjecting magnesium or a magnesium-based compound known to absorb hydrogen, to a hydrogenation in order to obtain the corresponding hydride in the form of a powder;

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b) mixing the so-obtained hydride powder with the other element(s) or compound(s) or with a hydride of said other element(s) or compound(s);

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c) subjecting the so-obtained mixture to an intensive mechanical grinding in order to obtain the corresponding nanocomposite in the form of a hydride; and, if required,

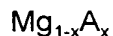
d) subjecting the nanocomposite obtained in step c) to a hydrogen desorption.

2. The process according to claim 1, characterized in that, in step

a), use is made of magnesium.

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3. The process according to claim 1, characterized in that, in step a), use is made of a magnesium-based compound of the formula:

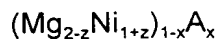


wherein A is at least one element selected from the group consisting of Li, Ca, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Al, Y, Zr, Nb, Mo, In, Sn, O, Si, B, C, F and Be, and x is a number equal to or lower than 0.3.

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4. The process according to claim 1, characterized in that in step

a), use is made of a magnesium-based compound of the formula:



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Sub B1

*Insert A* ~~in which A and x are defined as in claim 3 and z is a number comprised between -0.3 to +0.3.~~

*A* 5. The process according to ~~any one of claims 1 to 4,~~ *claim 1*  
 5 characterized in that, in step b), use is made of another element and said other element is selected from the group consisting of V, Ti, Fe, Co, Nb, Na, Cs, Mn, Ni, Ca, Ce, Y, La, Pd, Hf, K, Rb, Rh, Ru, Zr, Be, Cr, Ge, Si, Li and their hydrides.

6. The process according to claim 5, characterized in that the  
 10 other element is V.

7. The process according to claim 5, characterized in that the other element is Nb.

*Sub B2* 15 *A* 8. The process according to ~~any one of claims 1 to 4,~~ *claim 1*  
 characterized in that in step b), use is made of another compound and said at least one other compound is selected from the group consisting of  $\text{LaNi}_5$ ,  $\text{MmNi}_5$ ,  $\text{ZrMn}_2$ ,  $\text{ZrV}_2$ ,  $\text{TiMn}_2$ ,  $\text{Mg}_2\text{Ni}$  and their hydrides, the solid solutions of the formula  $\text{V}_{1-y}\text{T}_y$  where y ranges from 0 to 1,  $(\text{V}_{0.9}\text{Ti}_{0.1})_{0.95}\text{Fe}_{0.05}$  and the amorphous alloys of Mg-Ti.

20 *A* 9. The process according to ~~any one of claims 6 to 8,~~ *claim 1*  
 characterized in that in step b), use is made of the other element or compound in such an amount that the atomic or molar percentage of said other element or compound in the mixture be equal to or lower than 10%.

25 10. The process according to claim 9, characterized in that, in step b), use is made of the other element or compound in such an amount that the atomic percentage of said other element or compound in the mixture is equal to 5%.

30 11. The process according to claim 10 characterized in that, in step b), use is made of the other element or compound in such an amount of the atomic percentage of said other element or other compound in a mixture be equal to 3%.

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12. • The process according to <sup>Claim 1</sup>~~any one of claims 1 to 11~~, characterized in that in step c), the mixture is subjected to an intensive mechanical grinding in a ball milling machine for a period of 5 to 20 hours.

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13. A nanocomposite based on magnesium and one or more other elements or compounds known to absorb hydrogen, characterized in that it is obtained by the process according to <sup>Claim 1</sup>~~any one of claims 1 to 12~~ and it has a very fine microstructure with activated interfaces.

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14. Use of the nanocomposite according to claim 13 for storing and transporting hydrogen.

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